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BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Application Number: 10/729,804
Filing Date: December 5, 2003
Appellant(s): Lingshiao Wang, Craig Barrack

Jeffrey Hsu (63,063)
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed December 24, 2009 appealing from the Office action mailed April 14, 2009.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is correct.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

US 2003/0035374 A1	CARTER	02-2003
US 7126913 B1	PATEL	04-2004
US 5978356	ELWALID	11-1999
US 7349403 B2	LEE	03-2008
US 6987732 B2	GRACON	01-2006

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claims 1-8, 11 and 17-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Carter et al (hereinafter Carter), U.S. Patent Publication US 2003/0035374 A1 in view of Patel et al (hereinafter Patel), U.S. Patent 7,126,913 B1 and in further view of Elwalid et al (hereinafter Elwalid), U.S. Patent 5,978,356.

As per Claim 1, Carter discloses substantial features of the invention, such as an egress rate controller [Carter: Abstract], a leaky bucket having an initial maximum number of tokens which decreases as packets are received in an associated output buffer at a

reception token rate for transmission (Carter: e.g., token/leaky bucket shaper) [0084], a plurality of token availability threshold registers (Carter: e.g., buffers 25a-c) [Fig. 4], and a packet suppression controller (Carter: e.g., Router 13) [Fig. 2] suppressing transmission of a packet having a traffic class association of claim 1 (Carter: e.g., decreasing buffer output rate) [Abstract] (e.g. Router with traffic rate control 304) [Fig. 3]. However, Carter does not expressly disclose the additional recited feature of the registers that comprise the egress rate controller "specifying a corresponding plurality of token amounts defining token availability regions". The feature is expressly disclosed by Patel in a related endeavor.

Patel discloses as his invention a method and system for managing transmission resources in a wireless communications network including receiving a plurality of packets and determining a time duration for transmission of each packet. A power level for transmission of each packet over the time duration is further determined. Based on the time duration and the power level determined for each packet, a wireless resource impact is determined for each packet. Transmission resources are allocated to each packet based on the wireless resource impact determined for each packet [Abstract]. In particular, Patel discloses the recited features of the registers specifying a corresponding plurality of token amounts defining token availability regions ({X , Y} Token Regions) [Figs . 3, 4 & 8a-e].

It would thus be obvious to one of ordinary skill in the art at the time of the invention to combine and/or modify Carter's invention with the above recited features, as disclosed by Patel, for the motivation of providing a method and system for

managing transmission resources in a wireless communications network architecture [col 1, L30-34] [Fig. 1].

Further, with regards to the claim, while the combination of Carter and Patel disclose substantial features of the invention as above, neither expressly discloses the additional recited feature of a leaky bucket "wherein a size of the leaky bucket is less than or equal to a size of the associated output buffer" and the controller selectively suppressing transmission of a packet having a traffic class association "based on a current token availability level being within a token availability region specifying transmission suppression of packets of the traffic class". However, the feature is expressly disclosed by Elwalid in a related endeavor.

Elwalid discloses as his invention a traffic shaping system for increasing the connection-carrying capacity of a network node by shaping the data cells to increase the admissible number of connections. The traffic shaper system uses a data buffer at the ingress of the network node to 'selectively' buffer classes of data cells. As such, the traffic shaping system exploits differences in delay tolerances between traffic classes to shape the less delay sensitive traffic classes to reduce the effective bandwidth of a connection of the particular traffic class to thereby increase the nodal connection-carrying capacity [Abstract]. In particular, Elwalid discloses the additionally recited features of a leaky bucket "wherein a size of the leaky bucket is less than or equal to a size of the associated output buffer" (Elwalid: e.g., Dual Leaky Bucket 16 is characterized by three parameters {r, B_T, P}, wherein 'B_T' is the leaky bucket '*Token*

Buffer Size') [col 5, L16-35] (e.g., 'shaper token buffer size' B_{TS} and 'data buffer size' B_{DS}) [col 6, L5-20] [also, col 11, L29-55] [Fig. 3], and the controller selectively suppressing transmission of a packet having a traffic class association "based on a current token availability level being within a token availability region specifying transmission suppression of packets of the traffic class" (e.g., a node employing a Leaky Bucket Regulator of Buffer Size "B_{token}") [col 16, L27 – col 17, L26].

It would thus be obvious to one of ordinary skill in the art at the time of the invention to modify the combination of Carter and Patel with the above recited feature, as disclosed by Elwalid, for the motivation of providing a method and system of traffic shaping that increases the connection-carrying capacity of a network node by the shaping of data cells (or packets) [Abstract] [col 2, L9-26].

As per Claim 2, Carter discloses the egress rate controller claimed in claim 1, further comprising a classifier classifying received packets in accordance with a plurality of traffic classes (e.g., QoS Class of the packet) [0051] [Figs. 1 & 4].

As per Claim 3, Carter discloses the egress rate controller claimed in claim 1, further comprising a scheduler delaying packet transmission scheduling in accordance with a packet transmission suppression signal provided by the packet transmission suppression controller (Scheduler 305) [Fig. 3].

As per Claims 4 and 11, while Carter discloses substantial features of the invention, such as the egress rate controller and the plurality of token availability threshold level registers of claim 1, he does not expressly disclose the recited feature of the controller further comprising a bucket size register holding a value representative of a maximum number of tokens allocated to the leaky bucket. The features are expressly disclosed by Patel in a related endeavor.

Patel discloses as his invention a method and system for managing transmission resources in a wireless communications network including receiving a plurality of packets and determining a time duration for transmission of each packet [Abstract]. In particular, Patel discloses the recited feature of the controller further comprising a bucket size register holding a value representative of a maximum number of tokens allocated to the leaky bucket (e.g., Max Bucket Depth of "10") [Figs. 8a-e].

It would thus be obvious to one of ordinary skill in the art at the time of the invention to combine and/or modify Carter's invention with the recited feature of the controller further comprising a bucket size register holding a value representative of a maximum number of tokens allocated to the leaky bucket, as disclosed by Patel, for the motivation of providing a method and system for managing transmission resources in a wireless communications network architecture [col 1, L30-34] [Fig. 1].

Claim 11 recites that same limitations as claim 4, is distinguished only by its statutory category and thus rejected on the same basis.

As per Claim 5, Carter discloses the egress rate controller claimed in claim 4, further comprising an output buffer, the size of the leaky bucket, in tokens, being at most equal to the size of output buffer, employing an output buffer larger than the leaky bucket enabling suppression of packet transmission without discarding packets (e.g., Output Buffer 25) [Fig. 3] [0086] [Fig. 9].

As per Claim 6, Carter discloses the egress rate controller claimed in claim 1, wherein the egress rate controller is associated with an output port of the edge network node (e.g., Port 54) [Fig. 5].

As per Claim 7, Carter discloses an communication network node comprising at least one egress rate controller claimed in claim 1 (egress router 13a/b) [Figs. 2, 4 & 6]

As per Claim 8, Carter discloses an communication network node comprising at least one egress rate controller claimed in claim 1 associated with at least one output port thereof (egress router 13a/b) (Port 54) [Figs. 2, 4 & 6]

As per Claim 17 and 21, Carter discloses the method of effecting egress rate control as claimed in claim 16, wherein selectively suppressing packet transmission, the method further comprises a step of: selectively suppressing packet transmission scheduling (e.g., slow down traffic from buffer) [0073] (scheduler 302) [0078] [0081].

Claim 21 recites the same limitations as claim 17, and thus rejected on the same basis.

As per Claim 18 and 23, Carter discloses the method of effecting egress rate control as claimed in claim 17, further comprising a step of: rescheduling the packet for transmission [0073] [0078].

Claim 23 recites the same limitations as claim 18, and thus rejected on the same basis.

As per Claim 19, Carter discloses the method of effecting egress rate control as claimed in claim 16, further comprising a prior step of: classifying packets in accordance with a plurality of traffic classes (i.e., segregating packet traffic according to CoS) [0078].

As per claim 20, while Carter discloses substantial features of the invention, such as the egress rate controller and the plurality of token availability threshold level registers of claim 1, he does not expressly disclose the recited features of the egress controller further comprising a step of determining whether a plurality of tokens corresponding to a size of the packet are available in the leaky bucket; and selectively suppressing packet transmission if there are insufficiently many tokens available in the leaky bucket. The features are expressly disclosed by Patel in a related endeavor.

Patel discloses as his invention a method and system for managing transmission resources in a wireless communications network including receiving a plurality of packets and determining a time duration for transmission of each packet [Abstract]. In

particular, Patel discloses the additional recited feature of the egress controller further comprising a step of determining whether a plurality of tokens corresponding to a size of the packet are available in the leaky bucket (e.g., "token available for packet in queue?" 114/134) [Fig. 7] (packet size "L") [col 11, L36]; and selectively suppressing packet transmission if there are insufficiently many tokens available in the leaky bucket [col 8, L60 –col 9, L4] [Fig. 7] [col 9, L44-60] [col 10, L32-40] [Figs. 8a-e].

It would thus be obvious to one of ordinary skill in the art at the time of the invention to combine and/or modify Carter's invention with the above recited feature, as disclosed by Patel, for the motivation of providing a method and system for managing transmission resources in a wireless communications network architecture [col 1, L30-34] [Fig. 1].

As per Claim 22, Carter discloses the method of effecting egress rate control as claimed in claim 21, further comprising a step of: storing the packet in an output buffer (e.g., Output buffer 25) [Fig. 3].

Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over Carter et al (hereinafter Carter), U.S. Patent Publication US 2003/0035374 A1 in view of Patel et al (hereinafter Patel), U.S. Patent 7,126,913 B1, and in further view of Lee et al (hereinafter Lee), U.S. Patent, 7,349,403 B2.

As per Claim 16, while the combination of Carter, Patel, and Elwalid discloses substantial features of the invention, such as the egress rate controller, the plurality of token availability threshold level registers, the registers specifying a corresponding

plurality of token amounts defining token availability regions and the controller selectively suppressing transmission of a packet having a traffic class association based on a current token availability level being within a token availability region specifying transmission suppression of packets of the traffic class, as in claim 1, the additional recited feature of the method further comprising token availability thresholds, "wherein the token availability threshold levels corresponds to predetermined egress rate control responses to bandwidth utilization with respect to packet traffic classes" is expressly disclosed by Lee in a related endeavor.

Lee discloses as his invention a differentiated services device. The differentiated services device includes: a traffic metering unit to indicate whether an information element in a flow conforms to a peak rate and a committed rate; a storage congestion metering unit to determine whether the information element should be accepted or discarded; and a marking unit to mark the information element with one of a plurality of mark values, wherein the marking unit is coupled to the traffic metering unit and the storage congestion unit [Abstract] [col 4, L25-34]. In particular, Lee discloses the additionally recited feature the method "wherein the token availability threshold levels corresponds to predetermined egress rate control responses to bandwidth utilization with respect to packet traffic classes" (e.g., determining whether 'average usage of a class to which a flow belongs' is equal to, less than, or greater than a minimum / maximum threshold) [Figs. 1-2] [col 5, L31-45] (e.g., *Egress Port Link List*) [Fig. 20] (e.g., Conformance / Non-Conformance Received Packet with respect to Current Token Bucket "TB") [Figs. 31-33] (e.g. 'Accept' or 'Discard' Packet with respect to Minimum /

Maximum Threshold Levels and Drop Probability) [Figs. 34-41] (e.g. *Ingress* or *Egress* 'Packet Mode') [col 32, L47-54] (e.g., token availability threshold 'conformance / non-conformance') (e.g., CDROP /PDROP) [col 57, L64 –col 58, L31] [Figs. 36 & 37].

It would thus be obvious to one of ordinary skill in the art at the time of the invention to modify the combination of Carter, Patel and Elwalid with the above recited feature, as disclosed by Lee, for the motivation of providing a differentiated services device that overcomes the problems associated with "best effort service" processing of network traffic, and provides deterministic behavior in processing real time network traffic [col 4, L7-21].

Claims 9-10, 12-15 and 24-27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Carter et al (hereinafter Carter), U.S. Patent Publication US 2003/0035374 A1 in view of Patel et al (hereinafter Patel), U.S. Patent 7,126,913 B1, and in further view of Gracon et al (hereinafter Gracon), U.S. Patent, 6,987,732 B2 and Lee et al (hereinafter Lee), U.S. Patent, 7,349,403 B2.

As per Claim 9, while Carter discloses substantial features of the invention, such as the egress rate controller and the plurality of token availability threshold level registers of claim 1, he does not expressly disclose the recited features of an "ingress" rate controller, the controller further comprising threshold registers specifying a

corresponding plurality of token amounts defining token availability regions. The feature is expressly disclosed by Patel in a related endeavor.

Patel discloses as his invention a method and system for managing transmission resources in a wireless communications network including receiving a plurality of packets and determining a time duration for transmission of each packet [Abstract]. In particular, Patel discloses the recited features of an "ingress" rate controller (ingress control system 34), the controller further comprising threshold registers specifying a corresponding plurality of token amounts defining token availability regions ({X , Y} Token Regions) [Figs . 3, 4 & 8a-e].

It would thus be obvious to one of ordinary skill in the art at the time of the invention to combine and/or modify Carter's invention with the above recited features, as disclosed by Patel, for the motivation of providing a method and system for managing transmission resources in a wireless communications network architecture [col 1, L30-34] [Fig. 1].

Additionally, while the combination of Carter and Patel discloses substantial features of the invention such as the egress and ingress controllers of claim 1 and 9, respectively, as well as the threshold/discard registers, the additionally recited features of each packet discard probability register specifying a probability with which packets of a specific traffic class are to be dropped when a current token availability level is within a token availability region, and a packet acceptance controller selectively randomly discarding packets having a traffic class association based on the current token

availability level being within a token availability region specifying random packet discard of packets of the traffic class, are expressly disclosed by Gracon in a related endeavor.

Gracon discloses as his invention a packet scheduler including a packet manager interface, a policer, a congestion manager, a scheduler, and a virtual output queue (VOQ) handler [Abstract]. In particular, Gracon discloses the recited features of a packet discard probability register specifying a probability with which packets of a specific traffic class are to be dropped when a current token availability level is within a token availability region ("Drop Probability" Pb) [col 7, L45], and a packet acceptance controller selectively randomly discarding packets having a traffic class association based on the current token availability level being within a token availability region specifying random packet discard of packets of the traffic class ("…the packet is randomly dropped based on the calculated Pb") [col 7, L49-53]. Gracon also expressly discloses both egress and ingress traffic grooming / shape control of packets that is 'configurable' [col 2, L58 – col3, L26].

It would thus be obvious to one of ordinary skill in the art at the time of the invention to modify the invention resulting from the combination of Carter and Patel with the above recited features, as disclosed by Gracon, for the motivation of providing an apparatus that is programmable to accommodate existing protocols and to anticipate any future protocols, as well as to efficiently schedule packets in a broadband data stream [col 2, L11-23].

Further, with regards to the claim, while the combination of Carter, Patel and Gracon discloses substantial features of the invention as above, the additionally recited feature of an ingress rate controller further comprising a plurality of discard probability registers specifying a probability with which packets are to be dropped is expressly disclosed by Lee in a related endeavor.

Lee discloses as his invention a differentiated services device. The differentiated services device includes: a traffic metering unit to indicate whether an information element in a flow conforms to a peak rate and a committed rate; a storage congestion metering unit to determine whether the information element should be accepted or discarded; and a marking unit to mark the information element with one of a plurality of mark values, wherein the marking unit is coupled to the traffic metering unit and the storage congestion unit [Abstract] [col 4, L25-34]. In particular, Lee discloses the additionally recited feature of an ingress rate controller further comprising a plurality of discard probability registers specifying a probability with which packets are to be dropped (e.g., Registers 211 with 'Drop Probability') [Fig. 2] (e.g., Instruction and State Registers 226a-c] [Fig. 4] [col 9, L16-55] [Fig. 5] [col 10, L16-60] [Fig. 37] [col 56, L22-55] [Tables 1 & 2].

It would thus be obvious to one of ordinary skill in the art at the time of the invention to modify the combination of Carter, Patel and Gracon with the above recited feature, as disclosed by Lee, for the motivation of providing a differentiated services device that overcomes the problems associated with "best effort service" processing of network

traffic, and provides deterministic behavior in processing real time network traffic [col 4, L7-21].

As per Claim 10, while Carter discloses substantial features of the invention, such as the egress rate controller and the plurality of token availability threshold level registers of claim 1, he does not expressly disclose the recited features of an "ingress" rate controller, the controller further comprising a classifier classifying received packets in accordance with a plurality of traffic classes. The features are expressly disclosed by Patel in a related endeavor.

Patel discloses as his invention a method and system for managing transmission resources in a wireless communications network including receiving a plurality of packets and determining a time duration for transmission of each packet [Abstract]. In particular, Patel discloses the additional recited feature of an "ingress" rate controller (ingress control system 34) further comprising a classifier classifying received packets in accordance with a plurality of traffic classes [col 1, L36-41].

It would thus be obvious to one of ordinary skill in the art at the time of the invention to combine and/or modify Carter's invention with the above recited feature, as disclosed by Patel, for the motivation of providing a method and system for managing transmission resources in a wireless communications network architecture [col 1, L30-34] [Fig. 1].

As per Claim 12, Carter discloses the ingress rate controller claimed in claim 9, further comprising an input buffer, the size of the leaky bucket, in tokens, being at most equal to the size of input buffer, employing an input buffer larger than the leaky bucket providing a slack in the number of packets available for transmission to mask the effects of the ingress rate control effected (Input Buffers 41a-c) [Fig 4].

As per Claim 13, Carter discloses the ingress rate controller claimed in claim 9, wherein the ingress rate controller is associated with an input port of the edge network node (Port 54) [Fig. 5].

As per Claim 14, Carter discloses a communication network node comprising at least one ingress rate controller claimed in claim 9 (Ingress router 130) [Fig. 6].

As per Claim 15, Carter discloses an communication network node comprising at least one ingress rate controller (Ingress router 130) [Fig. 6] claimed in claim 9 associated with at least one input port thereof (Port 54) [Fig. 5].

As per Claim 24, while Carter discloses substantial features of the invention, such as the ingress rate controller and the plurality of token registers of claim 1, he does not expressly disclose the recited features of the 'ingress rate controller' further comprising threshold registers specifying a corresponding plurality of token amounts defining token availability levels. The feature is expressly disclosed by Patel in a related endeavor.

Patel discloses as his invention a method and system for managing transmission resources in a wireless communications network including receiving a plurality of packets and determining a time duration for transmission of each packet [Abstract]. In particular, Patel discloses the recited features of an “ingress” rate controller (ingress control system 34), the controller further comprising threshold registers specifying a corresponding plurality of token amounts defining token availability levels or regions ({X , Y} Token Regions) [Figs . 3, 4 & 8a-e].

It would thus be obvious to one of ordinary skill in the art at the time of the invention to combine and/or modify Carter’s invention with the above recited features, as disclosed by Patel, for the motivation of providing a method and system for managing transmission resources in a wireless communications network architecture [col 1, L30-34] [Fig. 1].

However, while the combination of Carter and Patel discloses substantial features of the invention such as the egress and ingress controllers of claim 1 and 9, respectively, as well as the threshold/discard registers, the additionally recited feature of the controller comprising the step of selectively randomly discarding packets of a particular traffic class when a current token availability level of a leaky bucket tracking packets is between two token availability threshold levels of a plurality of token availability threshold levels is more expressly disclosed by Gracon in a related endeavor.

Gracon discloses as his invention a packet scheduler including a packet manager interface, a policer, a congestion manager, a scheduler, and a virtual output queue (VOQ) handler [Abstract]. In particular, Gracon discloses the recited features of the controller selectively randomly discarding packets having a traffic class association based on the current token availability level being within a token availability region specifying random packet discard of packets of the traffic class (MinTh / MaxTh Packet Discard Parameters) (…the packet is randomly dropped based on the calculated Pb") [col 7, L28 – col 8, L12]. Gracon also expressly discloses both egress and ingress traffic grooming / shape control of packets that is 'configurable' [col 2, L58 – col3, L26].

It would thus be obvious to one of ordinary skill in the art at the time of the invention to modify Carter's invention with the above recited feature, as disclosed by Gracon, for the motivation of providing an apparatus that is programmable to accommodate existing protocols and to anticipate any future protocols, as well as to efficiently schedule packets in a broadband data stream [col 2, L11-23].

Further, with regards to the claim, while the combination of Carter, Patel and Gracon discloses substantial features of the invention as above, the additionally recited feature of the method further comprising token availability thresholds, wherein the token availability levels correspond to predetermined ingress rate control responses to bandwidth utilization with respect to packet traffic classes is expressly disclosed by Lee in a related endeavor.

Lee discloses as his invention a differentiated services device. The differentiated services device includes: a traffic metering unit to indicate whether an information element in a flow conforms to a peak rate and a committed rate; a storage congestion metering unit to determine whether the information element should be accepted or discarded; and a marking unit to mark the information element with one of a plurality of mark values, wherein the marking unit is coupled to the traffic metering unit and the storage congestion unit [Abstract] [col 4, L25-34]. In particular, Lee discloses the additionally recited feature the method wherein the token availability levels correspond to predetermined ingress rate control responses to bandwidth utilization with respect to packet traffic classes (e.g., determining whether 'average usage of a class to which a flow belongs' is equal to, less than, or greater than a minimum / maximum threshold) [Figs. 1-2] [col 5, L31-45] (e.g., *Ingress 'growth / line rate'*) [col 2, L24-26] (e.g., *Ingress*) [col 32, L10-37] (e.g., Conformance / Non-Conformance of received Packet with respect to Current Token Bucket "TB") [Figs. 31-33] (e.g. 'Accept' or 'Discard' Packet with respect to Minimum / Maximum Threshold Levels and Drop Probability) [Figs. 34-41] (e.g. *Ingress* or *Egress* 'Packet Mode') [col 32, L47-54].

It would thus be obvious to one of ordinary skill in the art at the time of the invention to modify the combination of Carter, Patel and Gracon with the above recited feature, as disclosed by Lee, for the motivation of providing a differentiated services device that overcomes the problems associated with "best effort service" processing of network traffic, and provides deterministic behavior in processing real time network traffic [col 4, L7-21].

As per Claim 25, while Carter discloses substantial features of the invention, such as the ingress rate controller and the plurality of token registers of claim 1, he does not expressly disclose the recited features of the "ingress" rate controller further comprising threshold registers specifying a corresponding plurality of token amounts defining token availability regions. The feature is expressly disclosed by Patel in a related endeavor.

Patel discloses as his invention a method and system for managing transmission resources in a wireless communications network including receiving a plurality of packets and determining a time duration for transmission of each packet [Abstract]. In particular, Patel discloses the recited features of an "ingress" rate controller (ingress control system 34), the controller further comprising threshold registers specifying a corresponding plurality of token amounts defining token availability regions ({X , Y} Token Regions) [Figs . 3, 4 & 8a-e].

It would thus be obvious to one of ordinary skill in the art at the time of the invention to combine and/or modify Carter's invention with the above recited features, as disclosed by Patel, for the motivation of providing a method and system for managing transmission resources in a wireless communications network architecture [col 1, L30-34] [Fig. 1].

However, while the combination of Carter and Patel discloses substantial features of the invention such as the egress and ingress controllers of claim 1 and 9, respectively, as well as the threshold/discard registers, neither expressly discloses the recited feature of the controller further comprising a step of randomly discarding packets

with a corresponding discard probability. The feature is expressly disclosed by Gracon in a related endeavor.

Gracon discloses as his invention a packet scheduler including a packet manager interface, a policer, a congestion manager, a scheduler, and a virtual output queue (VOQ) handler [Abstract]. In particular, Gracon discloses the recited feature of the controller further comprising a step of randomly discarding packets with a corresponding discard probability ("Drop Probability" Pb) [col 7, L45] ("…the packet is randomly dropped based on the calculated Pb") [col 7, L49-53].

It would thus be obvious to one of ordinary skill in the art at the time of the invention to modify the invention resulting from the combination of Carter and Patel with the above recited features, as disclosed by Gracon, for the motivation of providing an apparatus that is programmable to accommodate existing protocols and to anticipate any future protocols, as well as to efficiently schedule packets in a broadband data stream [col 2, L11-23].

As per Claim 26, Carter discloses the method of effecting ingress rate control as claimed in claim 24, further comprising a prior step of: classifying packets in accordance with a plurality of traffic classes (e.g., QoS Class of the packet) [0051] [Figs. 1 & 4].

As per Claim 27, while Carter discloses substantial features of the invention, such as the ingress rate controller and the plurality of token availability threshold level registers

of claim 1, he does not expressly disclose the recited features of the method further comprising a step of determining whether a plurality of tokens corresponding to a size of the packet are available in the leaky bucket. The feature is expressly disclosed by Patel in a related endeavor.

Patel discloses as his invention a method and system for managing transmission resources in a wireless communications network including receiving a plurality of packets and determining a time duration for transmission of each packet [Abstract]. In particular, Patel discloses the additional recited feature of the egress controller further comprising a step of determining whether a plurality of tokens corresponding to a size of the packet are available in the leaky bucket (e.g., "token available for packet in queue?" 114/134) [Fig. 7]. Patel additionally teaches that packets are only transmitted when sufficient tokens 52 are available in the token bucket 50 for the power level and duration of a transmission token 70 representing the packet [col 10, L31-41] [Figs. 8a-e]. Patel also teaches that if available resources do not exist to transmit a first packet in the queue 40, later queued packets for which sufficient resources are available will be transmitted to maximize use of available resources [col 9, L1-4].

It would thus be obvious to one of ordinary skill in the art at the time of the invention to combine and/or modify Carter's invention with the above recited features, as disclosed by Patel, for the motivation of providing a method and system for managing transmission resources in a wireless communications network architecture [col 1, L30-34] [Fig. 1].

However, while the combination of Carter and Patel discloses substantial features of the invention such as the egress and ingress controllers of claim 1 and 9, respectively, as well as the threshold/discard registers, neither expressly discloses the additionally recited features of selectively discarding the packet if there are insufficiently many tokens available in the leaky bucket. The features are expressly disclosed by Gracon in a related endeavor.

Gracon discloses as his invention a packet scheduler including a packet manager interface, a policer, a congestion manager, a scheduler, and a virtual output queue (VOQ) handler [Abstract]. In particular, Gracon discloses the recited feature of selectively discarding the packet if there are insufficiently many tokens available in the leaky bucket (e.g. randomly dropping a packet based on drop probability Pb) [col 7, L28-53].

It would thus be obvious to one of ordinary skill in the art at the time of the invention to modify the invention resulting from the combination of Carter and Patel with the above recited feature, as disclosed by Gracon, for the motivation of providing an apparatus that is programmable to accommodate existing protocols and to anticipate any future protocols, as well as to efficiently schedule packets in a broadband data stream [col 2, L11-23].

(10) Response to Argument

Claim 1

With regards to the claims, and claim 1 in particular, Applicant firstly argues that none of the prior art references applied by the Office in rejecting the claims (Carter, Patel, Elwalid), either individually or in combination teaches or discloses the particular limitations of claim 1 which currently recites, in part:

"a leaky bucket having an initial maximum number of
tokens which decreases as packets are received in an associated output buffer at a reception token rate for transmission, wherein a size of the leaky bucket is less than or equal to a size of the associated output buffer;"

The Office respectfully disagrees and submits that Applicant has misinterpreted and/or not fully considered all of the teachings and disclosures of the prior art references. The Office also asserts and maintains that all of the recited claim features argued by Applicant are taught by the prior art reference(s) consistent with the requirements and language of the current claim recitation.

Specifically, with regards to the claim, and in support of his argument that neither Carter, Patel nor Elwalid fully discloses the above limitation of claim 1, Applicant argues

or remarks that even while Elwalid expressly teaches or discloses a Dual Leaky Bucket 16, defined or characterized by parameters (r, B_T, P) wherein r is a mean sustainable rate or 'token rate', B_T is the leaky bucket 'token buffer size', and P is the 'peak rate', nowhere does Elwalid teach that B_T (the "size" of the leaky bucket) is less than or equal to a size of the associated output buffer, as recited by the claim.

The Office respectfully disagrees and notes that in addition to Elwalid's teaching of a dual leaky bucket 16 characterized by parameters (r, B_T, P), Elwalid also expressly discloses shaper 28 comprising shaper token buffer 44, capable of holding B_{TS} tokens. Elwalid further teaches that "as in the dual leaky bucket 16, if a token is available in a shaper token buffer 44 and on a Ps line 46, circuitry 48 permits the regulated data packet to be 'output' from the data buffer 42 and thus from shaper 28." [col 5, L49-61]. In this regard, Elwalid discloses a relationship between B_T (the leaky bucket "size") and shaper 'output buffers' B_{TS} (shaper token buffer size) and B_{DS} (shaper data buffer size). In one embodiment, under 'lossless shaping', for example; Elwalid expressly teaches as part of his invention that a relationship between B_T, B_{TS}, and B_{DS} may be expressed as "$B_{DS} \geq B_T - B_{TS}$". Thus, the same mathematical relationship may be alternatively expressed as: "$B_{DS} + B_{TS} \geq B_T$", which clearly shows that the 'size' characterizing the leaky bucket is less than or equal to the 'size' of the output buffer (shaper output buffers B_{TS} and B_{DS}) the leaky bucket is associated with, as illustrated by Elwalid in Figure 3. The argued feature is thus expressly disclosed by at least Elwalid, and the Office thus maintains its rejection of claim 1 for at least the reasoning provided above.

Claims 2-8 depend from independent claim 1 and inherits all of its features. The claims remain unpatentable at least by virtue of its dependency on a previously rejected base claim.

With regards to independent claim 9 and dependent claim 11, Applicant makes similar arguments with respect to the rejection of the claims in view of Carter, Patel and Elwalid, and remarks that Elwalid fails to address the deficiencies previously expressed for claim 1. However, the Office has established that at least Elwalid teaches the argued limitation, and the Office accordingly maintains its rejection of claims 9 and 11 for at least the same reasons provided for claim 1 above.

Claims 16-27

With regards to the claim 16, Applicant firstly argues that none of the prior art references applied by the Office in rejecting the claims (Carter, Patel, Elwalid and Lee), either individually or in combination teaches or discloses particular limitation(s) of the claim, which currently recites, in part:

"selectively suppressing packet transmission for a packet of a particular traffic class when a current token availability level of a leaky bucket tracking packet transmissions is between two token availability threshold levels of a plurality of token availability threshold levels, wherein the token availability threshold levels correspond to predetermined egress rate control responses to bandwidth utilization with respect to packet traffic classes. The Office respectfully disagrees.

In response to the argument that none of the prior art references, either individually or in combination teaches the recited feature of "wherein the token availability threshold levels correspond to predetermined egress rate control responses", the Office remarks that while the combination of at least Carter, Patel, and Elwalid discloses substantial features of the invention, including the egress rate controller, the plurality of token availability threshold level registers, the registers specifying a corresponding plurality of token amounts defining token availability regions and the controller selectively suppressing transmission of a packet having a traffic class association based on a current token availability level being within a token availability region specifying transmission suppression of packets of the traffic class, as in claim 1 above, the argued feature of claim 16 is disclosed by at least Lee.

Lee discloses as his invention a differentiated services device. The differentiated services device includes: a traffic metering unit to indicate whether an information element in a flow conforms to a peak rate and a committed rate; a storage congestion metering unit to determine whether the information element should be accepted or discarded; and a marking unit to mark the information element with one of a plurality of mark values, wherein the marking unit is coupled to the traffic metering unit and the storage congestion unit [Abstract] [col 4, L25-34].

In particular, Lee discloses, inter alia, determining whether 'average usage of a class to which a flow belongs' is equal to, less than, or greater than a minimum / maximum threshold) [Figs. 1-2] [col 5, L31-45], receiving data packets and determining whether the packet is conforming or non-conforming with respect to a designated peak

rate / committed rate in associated with the operation of 'current token bucket TB' (e.g., Conformance / Non-Conformance Received Packet with respect to Current Token Bucket "TB") [Figs. 31-33], and determining whether to accept or discard a received data packet based a designated 'drop probability' and with respect to crossing / falling between a Minimum and/or Maximum Threshold (e.g. 'Accept' or 'Discard' Packet with respect to Minimum / Maximum Threshold Levels and Drop Probability) [Figs. 34-41] (e.g. *Ingress* or *Egress* 'Packet Mode') [col 32, L47-54] (e.g., token availability threshold 'conformance / non-conformance') (e.g., CDROP /PDROP) [col 57, L64 –col 58, L31] [Figs. 36 & 37].

It is thus clear that the 'Minimum / Maximum Thresholds', expressly disclosed by Lee are equivalent or corresponding to the 'token availability threshold levels' of the claimed invention. In this regard, Applicant additionally argues that even if the thresholds of Lee and the claimed invention were similar, Lee fails to suggest that the disclosed 'thresholds' are "corresponding to predetermined egress rate control responses to bandwidth utilization." In response to this remark, the Office firstly notes with emphasis that Lee's express teaching of 'Minimum / Maximum Thresholds' with respect to 'controlling' / policing data packet flows and/or rates (i.e., accepting / discarding data packets) includes egress and/or ingress rate control of data packets (e.g., ingress rate) [Lee: col 2, L24-26] (e.g., outputting packets from an egress point) [col 3, L5-12] [col 5, L31-45] (e.g., service type or mode of operation, including 'ingress / egress cells' or segments) [col 13, L6-15]. Lee also expressly teaches that the thresholds of his invention are dynamic or 'programmable' [col 23, L12]. As such, the

Office asserts that there is at least suggestion by Lee that the disclosed thresholds are related to egress / ingress rate control responses to bandwidth use and/or that they may be assigned accordingly as a design criteria.

Additionally, the Office also notes that the above argued limitation of claim 16 is at the very least well-known in the art, as recognized and/or acknowledged by Appellant himself in the background of his invention [0015-0016]. As noted by Appellant himself, prior art U.S. Pat 6,167,027 discloses "a flow control mechanism where each access node includes a leaky bucket component, and each time an incoming packet is received by the leaky bucket component, the number of available tokens is compared to two 'predetermined threshold values' (e.g., a comparing the available number of tokens with a predetermined 'low threshold' and a 'high threshold' of the leaky bucket).

Based on the above, it is clear that the argued feature of claim 16 is taught or disclosed by the prior art combination, or is at least well-known in the art, and the Office accordingly maintains its rejection of the claim for at least these reasons.

Claims 17-23 depend from independent claim 16 and inherits all of the features of the parent claim. The claims remain unpatentable at least by virtue of its dependency on a previously rejected base claim.

Claim 24 recites similar limitations as claim 16, except that it recites "wherein the token availability threshold levels correspond to predetermined *ingress rate contro'* responses to bandwidth utilization…". Applicant argues the same points as those for claim 16, and the Office accordingly maintains its rejection of the claim for at least the same reasoning provided above in response to the argued feature of claim 16.

Claims 25-27 depend from independent claim 24 and inherits all of the features of the parent claim. The claims remain unpatentable at least by virtue of its dependency on a previously rejected base claim.

Claims 9-10 and 12-15

With regards to the claims, and claim 9 in particular, Applicant argues that none of the prior art references applied by the Office in rejecting the claims (Carter, Patel, Gracon, Lee), either individually or in combination teaches or discloses the particular limitations of claim 1 which currently recites, in part:

"a plurality of packet discard probability registers, each packet discard probability register specifying a probability with which packets of a specific traffic class are to be dropped when a current token availability level is within a token availability region…". The Office respectfully disagrees.

In response to the argument, the Office firstly remarks that at least Lee discloses the additionally recited feature of an ingress rate controller further comprising a "plurality" of discard probability registers specifying a probability with which packets are to be dropped (e.g., Registers 211 with 'Drop Probability') [Fig. 2] (e.g., Instruction and State Registers 226a-c] [Fig. 4] [col 9, L16-55] [Fig. 5] [col 10, L16-60] [Fig. 37] [col 56, L22-55] [Tables 1 & 2]. In this regard, Applicant argues that despite the cited disclosures to Lee, Lee does not disclose or suggest the "registers specifying a probability with which packets of a specific class are to be dropped when a current token availability level is within a token availability region".

However, the Office notes with emphasis that Lee discloses as part of his invention several Instruction & State Registers 226a-c for implementation of his invention [Fig. 4]. Lee additionally and explicitly teaches with respect to Figures 34 and/or 38 that data packets received may be 'accepted' or 'discarded' by Storage Congestion Metering Unit5 265 depending on whether a minimum / maximum threshold is 'crossed', or if memory space occupancy is between a minimum threshold and a maximum threshold and according to a determined data packet "drop probability" [Fig. 38] [col 59, L36-61]. Accordingly, it is clear that the disclosed registers of Lee's invention, characterized by maximium / minimum thresholds, which are used to determine what packets are to be dropped according to a 'drop probability', appropriately satisfies the argued feature consistent with the claim language, and the Office maintains its rejection of the claim for at least the above reasons.

Claims 10 and 12-15 depend from independent claim 9 and inherit all of the features of the parent claim. The claims remain unpatentable at least by virtue of its dependency on a previously rejected base claim.

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

(12) Conclusion

For the above reasons, having shown that the combination of the prior art references expressly teach and/or disclose all the features of the argued independent claims and respective dependent claims, the Office firmly asserts that the rejection of the claimed invention in view of the prior art reference(s) should be sustained.

Respectfully submitted,

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